

EVALUATION OF PITCH CANKER INCIDENCE IN  
NATIONAL FORESTS IN FLORIDA - 1976

by

Phyllis A. Dugar<sup>1/</sup>, Joseph A. Dugoni<sup>2/</sup>, Chuck Dull<sup>3/</sup>,  
John Ghent<sup>4/</sup>, and Robert Uhler<sup>5/</sup>

ABSTRACT

*An evaluation of pitch canker incidence and severity was conducted on each ranger district of the Appalachian, Ocala, and Osceola National Forests in Florida. Overall infection was very low to negligible in each ranger district. The Appalachian and Lake George Ranger Districts had an average infection incidence of 4.8 and 3.1 percent, respectively; while the Wakulla, Osceola, and Seminole Ranger Districts showed an average infection incidence of 0.2, 0, and 0 percent, respectively. However, in age class 11-16 years, infection averaged 33.6 percent in those stands evaluated on the Appalachian Ranger District. This was the most severe infection incidence encountered throughout the survey.*

*Disease severity was generally expressed as terminal dieback accompanied with lateral branch dieback on the upper third of the crown.*

INTRODUCTION

Pitch canker of pine was first observed in 1945 on Virginia pine (*Pinus virginiana* Mill.) near Asheville, North Carolina (5). It can attack many species of pine, including both varieties of slash

---

<sup>1/</sup> and <sup>2/</sup> Plant Pathologist and Biological Technician, U.S. Forest Service, S&PF, Pineville, Louisiana.

<sup>3/</sup> Entomologist, U. S. Forest Service, S&PF, Doraville, Georgia.

<sup>4/</sup> Entomologist, U. S. Forest Service, S&PF, Asheville, North Carolina.

<sup>5/</sup> Bio-statistician, U. S. Forest Service, S&PF, Atlanta, Georgia.

(*Pinus elliottii* Engelm. var. *elliottii* and *densa*), longleaf (*Pinus palustris* Mill.), shortleaf (*Pinus echinata*, Mill.), Scotch (*Pinus sylvestris* L.), pitch (*Pinus rigida* Mill.), Table-Mountain (*Pinus pungens* Lamb.), and eastern-white pine (*Pinus strobus* L.) (1, 2). Loblolly pine appeared to be relatively resistant to pitch canker, but recently pitch canker symptoms have been observed in loblolly stands and seed orchards in Florida, Mississippi, and Louisiana, and in sand pine (*Pinus clausa* Chapm.) in Florida, (comm. C. S. Moses) (2).

In 1949, Snyder et al., reported that *Fusarium lateritium* f. sp. *pini* Hepting was the causal organism of pitch canker (7). Recent laboratory analyses of pitch cankered material has consistently yielded *Fusarium moniliforme* var. *subglutinans* (4), and pathogenicity tests with *F. moniliforme* var. *sub.*, have proven the organism capable of causing pitch canker.

Symptoms of pitch canker are easily detected. Traditionally symptoms are described as a sunken canker on the main bole that exudes excessive amounts of pitch accompanied with terminal dieback. Wood beneath the canker is always heavily pitch soaked and discolored. Currently symptoms on slash pine have been described as numerous cankers on lateral branches scattered throughout the upper crown. The terminal leader is generally attacked and killed. A secondary or lateral branch will assume dominance causing a crook in the tree. Depending on the extent of initial infections and how many times a tree is reinfected, a severe dieback situation can arise, causing a reduction in growth and to a lesser extent some mortality.

Pitch canker has been found in all 67 Florida counties infecting slash pine in plantations, seed orchards, and natural stands (6). Disease incidence has greatly intensified and become more widespread since the initial survey made by Bethune and Hepting (3). As of May 1976, disease incidence ranged from 2% in trees 5 to 10 years to 25% in trees 23 to 28 years (6).

With such a potentially damaging disease, the National Forests in Florida requested that State and Private Forestry conduct an incidence evaluation on slash pine stands within the forests. This evaluation was planned and conducted through a cooperative effort between the National Forests in Florida, the Alexandria Field Office, Asheville Field Office, and Doraville Field Office, U. S. Forest Service, State and Private Forestry. The objective of this survey was to determine incidence and severity of pitch canker in slash pine stands in the Appalachicola, Ocala, and Osceola National Forests in Florida.

## METHODS

### SLASH PINE STAND EVALUATION -

The survey was conducted in each National Forest district. They are: the Appalachicola and Wakulla Ranger Districts of the Appalachicola National Forest; the Seminole and Lake George Ranger Districts of the Ocala National Forest; and the Osceola Ranger District of the Osceola National Forest.

Six stand age class groupings per ranger district were evaluated. They were:

<u>Age Group Code</u>	<u>Years Planted</u>
1 ( 5-10)	1971-1966
2 (11-16)	1965-1960
3 (17-22)	1959-1954
4 (23-28)	1953-1958
5 (29-34)	1947-1952
6 (35-40)	1941-1936

Two primary and two alternate slash pine stands, at least five years old, were randomly selected from CISC Utility Listings. Two of the four stands selected were evaluated per age group per ranger district.

#### 1. Plantations -

Five row plots were randomly selected in each stand. Data were then recorded on the first 25 trees encountered in each row. Trees or rows at the stand edge were eliminated. Individual tree data were recorded as follows: 1--healthy; 2--1-3 lateral branch tips with dieback only; 3--terminal dieback only; 4--terminal dieback, 1-3 lateral branch tips with dieback only; 5--terminal dieback, less than half the crown with dieback; 6--terminal dieback, more than half the crown with dieback; 7--dead from dieback. These severity ratings were used to establish severity indexes. (See Appendix 1)

#### 2. Natural Stands and Direct Seeded Areas -

Some of the slash pine stands in the three Florida National Forests are natural stands and direct seeded stands. These stands were not surveyed according to the aforementioned plan for surveying plantations because there is no designated row scheme in these areas.

Stand dimensions were ascertained from aerial photos (4" = 1 mile). Five with distances were randomly selected per stand, and at each

distance a compass transect with 5' on either side was shot. Tree data, as described under Plantations, were recorded on the first 25 trees in each plot. Individual tree data were recorded on a total of 125 trees per stand. (See Appendix 2)

## RESULTS

Tables 1-3 present infection and severity ranges as found in each ranger district of the respective National Forests. A total of 6,305 acres was evaluated during this survey. Incidence was low in every ranger district except in the Appalachicola, where infection incidence was 33.6% in age class 11-16 years. Infection, if present, was scattered throughout other age class ranges and no correlations could be made with infection intensity and age class.

Tables 1-3 also present average infection incidence over an entire ranger district. These figures further reflect that pitch canker is present in very small proportions over any given ranger district.

Mortality from pitch canker in infected stands was negligible. Most pitch cankered trees showed symptoms of terminal dieback accompanied with dieback on the upper third of the crown. As previously mentioned, these symptoms are characteristic of pitch canker as it is now.

The severity index indicated for each age range is an average of disease ratings for each tree in a stand. These severity indexes range from 1-7. One indicates trees are healthy to seven which indicates dead from dieback.

## DISCUSSION

The greatest amount of infection was found in the extreme southwestern portion of the Appalachicola Ranger District. This area should be monitored closely in the upcoming months, as it may serve as an infection center. To accomplish this, plots should be established in surrounding areas and examined during the fall of the next few years, to determine whether infection is increasing in that area, decreasing, remaining static, or spreading into surrounding areas.

Pitch canker does not appear to be in epidemic proportions in any of the National Forests. However, the situation as it exists, throughout the slash pine range in Florida, is still very serious. The impact on forest resource is evident from growth loss and tree malformation moreso than from tree mortality.

At present, there are no recommended control tactics for pitch canker. Research projects have been initiated at the Southeastern Forest Experiment Station and at the University of Florida.

Table 1. Pitch Canker Incidence on Appalachicola N.F.

Ranger District	Age Range	% of Total Acres Surveyed <sup>a/</sup>	% Infection	Severity Index	Composite % infected per Ranger Dist. <sup>b/</sup>
Appalachicola	5-10	.7 (84)	6.4	1.15	4.8
	11-16	1.1 (42)	33.6	2.12	
	17-22	2.0 (47)	1.2	1.02	
	23-28	11.8 (919)	0	1.00	
	29-34	9.3 (158)	0	1.00	
	35-40	-	0	1.00	
Wakulla	5-10	2.2 (299)	0	1.00	0.2
	11-16	2.3 (134)	.8	1.02	
	17-22	1.8 (107)	.8	1.03	
	23-28	31.0 (279)	0	1.00	
	29-34	17.0 (719)	0	1.00	
	35-40	4.8 (522)	0	1.00	

<sup>a/</sup> Number in ( ) shows actual number of acres surveyed.

<sup>b/</sup> These figures based on total acres in a ranger district.

Table 2. Pitch Canker Incidence, Osceola N.F.

Ranger District	Age Range	% of Total Acres Surveyed <sup>a/</sup>	% Infection	Severity Index	Composite % infected per Ranger Dist. <sup>b/</sup>
Osceola	5-10	4.3 (45)	0.8	1.03	0.0
	11-16	1.0 (57)	1.6	1.05	
	17-22	2.80 (171)	.4	1.02	
	23-28	12.60 (113)	0	1.00	
	29-34	8.50 (360)	0	1.00	
	35-40	1.05 (114)	0	1.00	

<sup>a/</sup> Number in ( ) shows actual number of acres surveyed.

<sup>b/</sup> These figures based on total acres in ranger district.

Table 3. Pitch Canker Incidence, Ocala N.F.

Ranger District	Age Range	% of Total Acres Surveyed <sup>a/</sup>	% Infection	Severity Index	Composite % infected per Ranger Dist <sup>b/</sup>
Seminole	5-10	8.5 (133)	0.4	1.01	0.0
	11-16	17.5 (629)	0	1.00	
	17-22	4.6 (157)	0	1.00	
	23-28	5.7 (108)	1.6	1.05	
	29-34	15.8 (149)	0	1.00	
	35-40	18.1 (260)	0	1.00	
Lake George	5-10	14.7 (78)	2.8	1.09	3.1
	11-16	11.3 (205)	7.6	1.22	
	17-22	8.8 (118)	0	1.00	
	23-28	11.4 (44)	4.0	1.14	
	29-34	16.3 (96)	0	1.00	
	35-40	23.0 (158)	0	1.00	

<sup>a/</sup> Number in ( ) shows actual number of acres surveyed.

<sup>b/</sup> These figures based on total acres in a ranger district.

## RECOMMENDATIONS

1. National Forest personnel should report any significant increases of pitch canker incidence.
2. The southwestern portion of the Appalachicola Ranger District will be the area selected to monitor pitch canker status. State and Private Forestry will be responsible for the implementation of this project.

## LITERATURE CITED

1. Artman, J. D. 1973. Eastern white pine--a new host for *Fusarium lateritium* f. *pini*. PDR 57:182-184.
2. Berry, C. R. and G. H. Hepting. 1969. Pitch canker of southern pines. USDA, Forest Service. Forest Pest Leaflet, No. 35, 4 p.
3. Bethune, J. E. and G. H. Hepting. 1963. Pitch canker damage to south Florida slash pine. J. For. 61:517-522.
4. Dugar, P. A., C. E. Affeltranger, C. W. Chellman, and P. H. Peacher. 1976. Laboratory analysis of "pitch canker" samples from Florida slash pine plantations and seed orchards--1976. U. S. For. Serv., S&PF, For. Pest Mgt. Rep. No. 76-2-22.
5. Hepting, G. H. and E. R. Roth. 1946. Pitch canker, a new disease of some southern pines. J. For. 44:742-744.
6. Phelps, W. R. and C. W. Chellman. 1976. Evaluation of pitch canker in Florida slash pine plantations and seed orchards 1976. U. S. Forest Serv., S&PF, Southeastern Area.
7. Snyder, W. C., E. R. Toole, and G. H. Hepting. 1949. Fusaria associated with mimosa wilt, sumac wilt, and pine pitch canker. J. Agric. Res. 78:365-382.

## APPENDIX I.

### General Instructions - Plantations

1. Slash pine stands in five ranger districts on three National Forests will be surveyed. They are: Appalachicola and Wakulla Ranger Districts, Appalachicola National Forest; Lake George and Seminole Ranger Districts, Ocala National Forest; Osceola Ranger District, Osceola National Forest.
2. Two stands in each of the selected age groupings have been chosen for examination. The age groupings and pre-selected stands are on the attached sheet.
3. Data are to be recorded from 25 trees per row plot in five randomly selected row plots per stand. (The random number table is supplied for use in locating random row plots within stands.)
4. Height and diameter measurements are to be taken from five healthy and five diseased trees per row plot. If five diseased trees are not found, record data on those available.
5. Measure area of this row plot. This is done by measuring the length of the row required to obtain data on 25 trees; measure the distance between one row and another. These two numbers are multiplied together to get area. This is done for every row plot.

## APPENDIX II.

### General Instructions - Natural Stands and Direct-Seeded Areas

1. The length and width of the stand is ascertained from scales indicated on the aerial photo maps. This information is needed when randomly selecting the five distances from the random number table where compass transects are shot.
2. Select a random number greater than 25 feet from stand edge. This number will be greater than 25 feet (elimination of edge effect) but less than the entire length of the stand. After selecting this distance, choose another random number, again greater than 25 feet. Walk into the stand the selected distance.
3. At this point, shoot a compass transect.
4. Record data on the first 25 trees that lie on this transect.  
NOTE: A constant width of 5 feet on each side of the transect or a total of 10 feet is used to calculate area in all these stands.
5. The area of these plots is calculated by using the length of the transect needed to obtain data on 25 trees and multiplying this distance by a constant width of 10 feet.
6. Randomly select 4 more distances within the plantation to shoot compass transects by repeating Step 2.

# Pitch Canker Survey - Individual Tree Data

Ranger District Code: \_\_\_\_\_ Compartment: \_\_\_\_\_ Stand: \_\_\_\_\_ Surveyor Code: \_\_\_\_\_

Date of Planting: 19\_\_\_\_ Age Group Code: \_\_\_\_\_ Spacing: \_\_\_\_\_ X \_\_\_\_\_ Acres: \_\_\_\_\_

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Area					
Space	Tree Code	Tree Code	Tree Code	Tree Code	Tree Code
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

# PLANTATIONS TO BE SAMPLED

Ranger Dist.	Age	COMPARTMENT, STAND			
		Plantations		Alternates	
Osceola	5-10	86,9	93,8	93,7	86,15
	11-16	4,15	50,14	76,1	98,12
	17-22	3,1	18,9	27,1	23,1
	23-28	6,7	46,12	76,4	51,10
	29-34	12,3	16,11	76,10	14,3
	35-40	73,12	98,3	88,6	2,5
Seminole	5-10	269,29	236,10	289,23	201,9
	11-16	260,9	236,3	228,20	250,2
	17-22	269,10	263,19	201,12	297,18
	23-28	262,7	268,15	269,22	225,18
	29-34	202,2	201,8	305,1	225,7
	35-40	222,18	204,29	204,27	204,31
Lake George	5-10	63,7	70,26	43,23	43,15
	11-16	35,12	90,1	69,17	34,11
	17-22	70,24	35,5	30,1	8,7
	23-28	34,19	70,19	51,15	69,22
	29-34	52,4	52,17	70,49	22,21
	35-40	70,2	35,29	70,37	10,21
Wakulla	5-10	219,6	329,11	312,1	233,10
	11-16	226,11	350,4	323,12	218,5
	17-22	338,10	204,6	339,8	337,13
	23-28	225,3	304,6	227,11	329,10
	29-34	205,1	208,5	325,9	325,16
	35-40	301,7	313,6	240,4	247,19
Apalachicola	5-10	72,4	94,23	38,18	19,3
	11-16	24,17	104,14	108,5	11,4
	17-22	26,14	55,22	28,6	106,19
	23-28	64,12	30,3	88,26	97,10
	29-34	108,2	60,29	88,17	108,31
	35-40	78,9	48,7	110,12	68,26